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10/560,023	12/08/2005	Sun-Uk Kim	LPP20053249US	1005

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LEXYOUME IP GROUP, PLLC
5180 PARKSTONE DRIVE, SUITE 175
CHANTILLY, VA 20151

EXAMINER	
SNELTING, ERIN LYNN	
ART UNIT	PAPER NUMBER
1741	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,023	KIM ET AL.	
	Examiner	Art Unit	
	Erin Snelting	1741	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6,7 and 9-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6,7 and 9-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Acknowledgement is made of amendment received 12-20-2010. Claims 1, 2, 6, and 9-11 are amended; new claims 13 and 14 are offered for consideration.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 2, 4, and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto ‘156 (US 3,867,156) in view of Fisher ‘347 (US 2,883,347) and Fukumoto ‘486 (US 3,717,486).

5. Regarding claims 1 and 4, Fukumoto ‘156 teaches heat-treating a plurality of silica gel pellets (column 3, lines 58-61) by increasing their temperature to 1050 to 1200°C (column 3, lines 62-64 – wherein the temperature range of Fukumoto ‘156

overlaps the claimed range, and it has been held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)), and maintaining the temperature for a predetermined time (column 4, lines 48-50), wherein the heat-treatment is performed in a rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36). Fukumoto '156 is silent regarding a specific speed of temperature increasing. In analogous art of silica gel processing, Fisher '347 teaches that speed of temperature increasing should not be too high in order to control the burning out of organic substances and prevent contamination of the silica product (column 6, lines 8-15). Also in analogous art of silica gel processing, Fukumoto '486 teaches that the speed of temperature increasing should not be too low in order to maintain strength of the silica product (column 3, line 66-column 4, line 14). It is considered, then, that Fisher '347 and Fukumoto '486 suggest that the speed of temperature increasing is a result effective variable that may be optimized for the benefit of preventing contamination and maintaining strength of the silica product. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Please see In re Boesch, 617 F.2d 272, 205 USPQ (CCPA 1980). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Fukumoto '156 by optimizing the speed of temperature increasing, as suggested by Fisher '347 and Fukumoto '486, for the benefit of preventing contamination and maintaining strength of the silica product.

6. Regarding claim 2, Fukumoto ‘156 is silent regarding the silica gel pellets having pores with a size of about 20-70 angstroms, and a pore volume of around 0.3 to 1.1 mL/g. However, Fukumoto ‘156 suggests that the physical properties of the gel may be selected, along with processing conditions, based on the desired properties of the product (column 3, lines 56-61; column 4, line 57-column 5, line 6). Fukumoto ‘486 also suggests that the physical properties of the gel may be selected in order to optimize foaming and based on the desired properties of the end product (column 3, lines 3-42). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Fukumoto ‘156, Fisher ‘347, and Fukumoto ‘486 by selecting pore size and pore volume of the silica gel pellets for the benefit of optimizing foaming and properties of the end product.

7. Regarding claim 10, Fukumoto ‘156 is silent regarding a specific filling density of the porous silica sphere. However, Fukumoto ‘156 does teach the temperature is maintained (column 4, lines 48-50) until the porous silica sphere has desired physical properties including sphere size, microstructure, porosity, bulk density, and specific surface area (column 4, line 53-column 5, line 33). It is considered that all of these properties are correlated to filling density, and thus Fukumoto ‘156 suggests that the time and temperature (“foaming conditions”, column 4, lines 59-60; column 4, lines 21-52) may be selected by one of ordinary skill in the art in order to achieve desired physical properties of the porous silica sphere including filling density.

8. Regarding claims 11-13, Fukumoto ‘156 teaches:

a. performing a heat-treatment on a plurality of silica gel pellets for n minutes, wherein the heat-treatment includes a temperature increasing stage and a temperature maintaining stage (column 3, line 58-column 4, line 1)

b. wherein during the temperature maintaining stage the silica gel pellets are maintained at between about 1050°C and about 1200°C (column 3, lines 63-64 - wherein the temperature range of Fukumoto '156 overlaps the claimed range. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976))

c. wherein the heat-treatment is performed in a rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36).

Fukumoto '156 is silent regarding the heating rate during the temperature increasing stage. In analogous art of silica gel processing, Fisher '347 teaches that heating rate should not be too high in order to control the burning out of organic substances and prevent contamination of the silica product (column 6, lines 8-15). Also in analogous art of silica gel processing, Fukumoto '486 teaches that the heating rate should not be too low in order to maintain strength of the silica product (column 3, line 66-column 4, line 14). It is considered, then, that Fisher '347 and Fukumoto '486 suggest that the heating rate is a result effective variable that may be optimized for the benefit of preventing contamination and maintaining strength of the silica product. Please see In re Boesch, 617 F.2d 272, 205 USPQ (CCPA 1980).

Fukumoto '156 is silent regarding the temperature increasing stage being of duration about n/2 minutes and the temperature maintaining stage being of duration about n/2 minutes. However, Fukumoto '156 suggests that heat-treatment times may

be selected to achieve a desired foaming and firing effect (column 4, lines 48-50; column 4, lines 25-50). It has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Further, the suggestions of Fisher '347 and Fukumoto '486 above to optimize heating rate during the temperature increasing stage also suggest optimizing the duration of the temperature increasing stage to reach a particular temperature.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Fukumoto '156 by optimizing the heating rate during the temperature increasing stage and the durations of the stages for the benefit of preventing contamination and maintaining strength of the silica product and achieving desired foaming and firing effects, as suggested by Fukumoto '156, Fisher '347, and Fukumoto '486.

9. Claims 6, 7, 9, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto '156 (US 3,867,156) in view of Fisher '347 (US 2,883,347) and Dobson '988 (US 4,392,988).

10. Regarding claim 6, Fukumoto '156 teaches a heat treatment process, wherein a plurality of silica gel pellets are subjected to a first heat-treatment at 400 to 900℃, and are subjected to a second heat-treatment at 1050 to 1200℃ (column 3, line 58-column 4, line 1 - wherein the temperature ranges of Fukumoto '156 overlaps the claimed ranges, and it has been held that in the case where the claimed ranges "overlap or lie

inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)) in which the heat-treatment process is performed using a rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36). Fukumoto '156 is silent regarding in the first heat treatment, the temperature being increased at an average speed of 35 to 70℃ per minute and regarding the heat-treatment being performed using at least two rotary tube furnaces. In analogous art of silica gel processing, Fisher '347 teaches that speed of temperature increasing is a result effective variable because it may be altered in order to control the burning out of organic substances and prevent contamination of the silica product (column 6, lines 8-15). Please see In re Boesch, 617 F.2d 272, 205 USPQ (CCPA 1980). In analogous art of forming porous ceramic spheres, Dobson '988 teaches using at least two furnaces for a first and second heat-treatment for the benefit of controlling the furnaces at different temperatures and/or atmospheres, thereby enabling more precise process controls and continuous processing of the spheres (column 5, lines 9-17; Figure). As Fukumoto '156 teaches performing heat-treatment in a rotary tube furnace, then it is considered that the suggestion of Dobson '988 to utilize at least two furnaces would suggest to one of ordinary skill in the art at the time of the invention to modify Fukumoto '156 by utilizing at least two rotary tube furnaces for the first and second heat treatments. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Fukumoto '156 by optimizing the speed of temperature increasing in the first heat-treatment , as suggested by Fisher '347, for the benefit of controlling the burning out of organic substances and preventing

contamination of the silica product, and by using at least two rotary tube furnaces, as suggested by Dobson ‘988, for the benefit of enabling more precise process controls and continuous processing of the spheres.

11. Regarding claim 7, Fukumoto ‘156 further teaches the first heat treatment is performed for 20 to 60 minutes (column 7, lines 14-15). Fukumoto '156 is silent regarding the second heat treatment being performed for 20 to 60 minutes. However, Fukumoto '156 suggests that such heat treatment times may be utilized to achieve a desired foaming and firing effect (column 4, lines 48-50; column 4, lines 25-39). It has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Fukumoto ‘156, Fisher ‘347, and Dobson ‘988 by optimizing the second heat treatment time for the benefit of achieving a desired foaming and firing effect, as suggested by Fukumoto ‘156.

12. Regarding claim 9, Fukumoto ‘156, Fisher ‘347, and Dobson ‘988 teach the silica gel pellets are subjected to the second heat treatment, in a second rotary tube furnace, as described for claim 6 above. Fukumoto ‘156 further teaches a second heat treatment temperature of 1100 to 1150℃ (column 3, lines 63-64; column 4, lines 25-29 - wherein the temperature range of Fukumoto ‘156 overlaps the claimed range. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)).

13. Regarding claim 14, Fukumoto '156 is silent regarding the silica gel pellets having pores with a size between about 20 Å and about 70 Å, and a pore volume between about 0.3 mL g^{-1} and about 1.1 mL g^{-1}. However, Fukumoto '156 suggests that the physical properties of the gel may be selected, along with processing conditions, based on the desired properties of the product (column 3, lines 56-61; column 4, line 57-column 5, line 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Fukumoto '156, Fisher '347, and Dobson '988 by selecting pore size and pore volume of the silica gel pellets for the benefit of optimizing foaming and properties of the end product.

Response to Arguments

14. Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection.

15. The declaration under 37 CFR 1.132 filed 12-20-2010 is noted but is moot in view of the new grounds of rejection.

Further, the declaration is not persuasive because it fails to establish the criticality of claimed heating rates or a conclusive effect of using a rotary furnace. Examiner has analyzed the totality of the data available, including examples from the 2009 Kim Declaration, the 2010 Kim Declaration, and the applicant's specification.

The available examples do not keep other variables constant, such as heat-treatment temperature and time, and thus it is difficult to deduce if any results are actually dependent upon critical heating rates and the use of a rotary furnace, or if such

results are unexpected. The evidence relied upon should establish that the differences in results are in fact unexpected and unobvious and of both statistical and practical significance. *Ex parte Gelles*, 22 USPQ2d 1318, 1319 (Bd. Pat. App. & Inter. 1992)

Further, there are very few examples having heating rates outside of the claimed ranges by which to evaluate the criticality of the claimed ranges. Namely, the examples having heating rates outside of the claimed ranges are Experiments I and II of the 2009 Kim Declaration, Exhibit A of the 2010 Kim Declaration, and Comparative Example 5 in the specification. Of these four, only two are also performed in a rotary furnace (Exhibit A and Comparative Example 5), and thus only two data points are available by which to evaluate the criticality of the claimed heating rates. To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin Snelting whose telephone number is (571) 272-7169. The examiner can normally be reached on Monday to Friday 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Daniels can be reached on (571) 272-2450. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Matthew J. Daniels/
Supervisory Patent Examiner, Art Unit 1741